Space Weather Forecast

Issued on Wednesday 9 October 2024 at 13:28 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of strong class flares. Ongoing S2/Moderate Solar Radiation Storm, chance of S3/Strong Solar Radiation Storm until day 3. G1-G2 Minor/Moderate storms expected, chance of G3/Strong storms and slight chance of G4/Severe storms days 2 and 3.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been at High levels with a Strong flare peaking at 09/0156 UTC from a spot near centre disk. There are currently five numbered sunspot regions visible. The large and previously active spot in the southwest is now in it's transit around the limb and therefore it's previous classification is preserved, with a delta present. The aforementioned large region in north-centre has a large mature positive leader, with numerous small trailing spots and weak penumbra surrounding them, one spot is of opposite polarity and connected to the leader therefore classified as a delta region. Two spots in close proximity reside in the southeast, approaching centre disk. The more westward spot, appears to be reducing in size and is simplifying, whereas the training spot is much larger now with a delta spot present in the compact central region. The final numbered spot is in the southeast, it appears to have slightly reduced in area, with a small decay in penumbra around intermediate spots. The two new regions reman small and unnumbered.

A large material-rich full halo coronal mass ejection was observed leaving the Sun in association with the Strong flare and filament eruption early on 09 Oct. This coronal mass ejection has been analysed as arriving at Earth late 10 or early 11 Oct.

Solar Wind / Geomagnetic Activity: The period was indicative of waning coronal mass ejection and coronal hole high speed stream influence. Solar wind speed remained slightly elevated. Interplanetary Magnetic Field, Bt, was initially Moderate, but gradually declined to Weak levels. The north-south component, Bz, favoured a negative (southward) orientation, with only brief spells of positive (northward), on a weakening trend. Geomagnetic activity was Unsettled to Active (Kp 3-4) with one G1/Minor storm (Kp 5) period.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was initially slightly raised but then decreased to background levels before responding to the strong flare on 09 Oct, rising to S2/Moderate storm levels.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

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Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is expected, with a chance of further isolated Strong-class flares until day 3 (11 Oct). From then) activity is then expected to decrease Low to Moderate, but with a slight chance of Strong-class flares.

Solar Wind / Geomagnetic Activity: There are two coronal mass ejections which may glance Earth early day 2 (10 Oct). A large full halo coronal mass ejection is then expected to arrive at Earth late day 2 or early day 3 (10/11 Oct) Oct.

Solar winds are slightly elevated, with a slight chance of increasing to elevated should any of the glancing coronal mass ejections have peripheral impacts at Earth from early day 2 (10 Oct). Late on day 2 (10 Oct) or more likely early day 3 (11 Oct), the full halo coronal mass ejection is expected to arrive, perhaps increasing wind speeds to strong. Solar wind speeds should then begin to ease back to slightly elevated by day 4.

Geomagnetic activity is expected to be Unsettled to Active (Kp 3-4) initially with a chance of isolated G1/Minor storms (Kp 5) due to either residual coronal mass ejection/coronal hole high speed stream effects or glancing coronal mass ejections early day 2 (10 Oct). Activity is then expected to increase later day 2 or early day 3 (10/11 Oct) due to the arrival of the full halo coronal mass ejection, bringing likely G1-G2/Minor-Moderate storms (Kp 5-6), a chance of G3/Strong storms (Kp 7) and a slight chance of G4/Severe storms (Kp 8), more weighted to day 3 (11 Oct). By day 4 (12 Oct) geomagnetic activity should begin to decline, becoming predominantly Quiet to Active (Kp 2-4), but with a chance of G1/Minor Storms (Kp 5), due to any residual coronal mass ejection effects.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) responded erratically to a strong flare and associated filament eruption. S2/Moderate storm levels are being observed, with a chance of rising above S3/Strong storm. Similar conditions are expected 10 Oct before easing from 11 Oct.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	Yes	30	70	80	60
Strong	**G3**	No	1	30	40	20
Severe	**G4**	No	1	10	20	1
Extreme	**G5**	No	1	1	2	1

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Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	Yes	80	70	60	60
Very Active	R3-R5 (X Class)	Yes	40	30	20	20

Solar Radiation Storms (High Energy Protons)

Radiation Storms	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	Yes	100	90	30	20
Very Active	≥ S3 *	No	50	30	5	5
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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